379511-2-1-TM

DATATAPE®

12-442, 12-442-2 DIRECT RECORD AMPLIFIERS

TECHNICAL MANUAL

BELL & HOWELL
DATATAPE DIVISION
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LIST OF EFFECTIVE PAGES

Title Page 379511-2-1-TM
List of Effective Pages 12-78
Pages i and ii 12-78
Pages 1-1 through 1-3 12-78
Page 1-4 Blank
Page 2-1 12-78
Page 2-2 Blank
Page 3-1 12-78
Page 3-2 Blank
Pages 4-1 through 4-3 12-78
Page 4-4 Blank
Pages 5-1 through 5-3 12-78
Page 5-4 Blank
Pages 6-1 through 6-10 12-78
Pages 7-1 through 7-3 12-78
Page 7-4 Blank

TABLE OF CONTENTS

		Page
SECTION I.	GENERAL DESCRIPTION	
	1-1. General	1-1
	1-5. Equipment Description	1-1
	1-8. Performance Characteristics	1-2
SECTION II.	INSTALLATION	
	2-1. General	2-1
SECTION III.	OPERATION	
	3-1. General	3-1
SECTION IV.	THEORY OF OPERATION	
	4-1. General	4-1
	4-3. Circuit Descriptions	4-2
SECTION V.	CALIBRATION AND MAINTENANCE	
	5-1. General	5-1
	5-3. Preventive Maintenance	5-1
	5-5. Troubleshooting and Corrective Maintenance	5-1
	5-12. Repair	5-2
	5-15. Field Repair Service	5-3
	5-17. Factory Repair Service	5-3
SECTION VI.	PARTS LIST	
	6-1. General	6-1
	6-3. Manufacturer's Codes	6-1
	6-5. Ordering Replacement Parts	6-1
	6-7. Parts Location Illustrations	6-1
SECTION VII.	SCHEMATICS	
	7-1. General	7-1

LIST OF ILLUSTRATIONS

Figure	Title	Page
1-1	Direct Record Amplifier	1-3
4-1	Block Diagram, Direct Record System	4-1
5-1	Typical Waveform for Linearly Mixed Signals	5-2
6-1	Direct Record Amplifier Circuit Card	6-2
7-1	Schematic, Direct Record Amplifier	7-3

LIST OF TABLES

Table	Title	Page
1-1	Typical Performance Characteristics	1-2
6-1	Parts List for the 12-442 Direct Record Amplifier	6-3
6-2	Parts List for the 12-442-2 Direct Record Amplifier	6-7

SECTION I

GENERAL DESCRIPTION

1-1. GENERAL.

1-2. This manual describes the Bell & Howell 12-442 and the 12-442-2 Direct Record Amplifiers. The two amplifiers are similar. The 12-442 Direct Record Amplifier operates over the bandwidths from 100 Hz to 300 kHz at tape speeds up to 60 inches per second. The 12-442-2 Direct Record Amplifier operates over the bandwidths from 400 Hz to 1 MHz at tape speeds up to 60 inches per second. Throughout the manual, the term "direct record amplifier" applies to both amplifier types.

1-3. In direct recording, the data input signal is mixed with a high frequency bias signal and recorded in an amplitude/time relationship on magnetic tape. The high frequency bias signal allows the data recording to be recorded on the linear portions of the magnetic tape magnetization curve.

1-4. The direct record amplifier is composed of two sections: a data signal amplifier section and a bias amplifier section. The data amplifier section provides the current source to drive the record head with an output signal proportional to the input signal. The bias amplifier section raises the bias signal to the level required for optimum recording. The bias and input signals are mixed at a common point before being applied to the record head. The bias and signal levels are a function of the record head and magnetic tape characteristics. A record enable relay inhibits these signals from reaching the record head in all operating modes except the RECORD mode.

1-5. EQUIPMENT DESCRIPTION.

1-6. The record amplifier, illustrated in figure 1-1, is constructed on a printed circuit board similar to the other record and reproduce amplifiers used in this record/reproduce system. One circuit board is used per channel. Each circuit board plugs into a connector in the amplifier case assembly and is positioned by guide slots. Operating power is furnished when the circuit board is installed in the amplifier case assembly. The components are mounted on one side of a double sided printed circuit board. A shield, to minimize RF interference and coupling between amplifiers, is mounted on the back side of the circuit board. The dimensions of the direct record amplifier are 4-19/32 inches high by 7-3/8 inches deep by 29/32 inches wide.

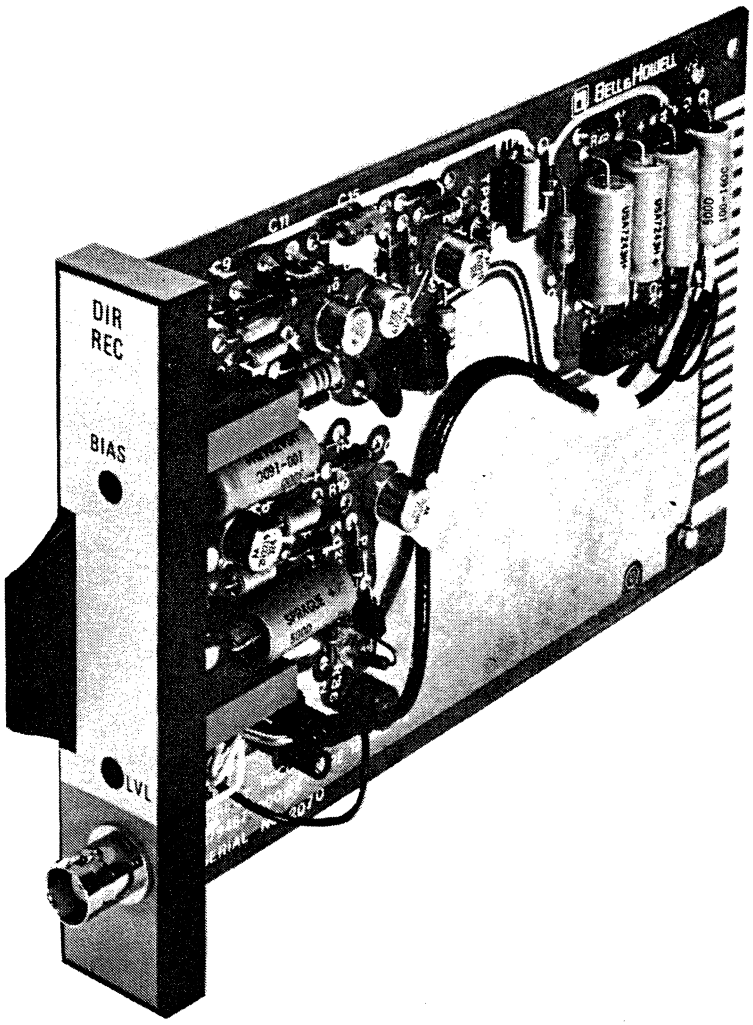
1-7. The input signal is normally through a BNC connector on the front panel. The front panel also contains two potentiometers for the bias level and the input level adjustments. The monitor gain potentiometer, all test points, and all the circuit components are accessible when the amplifier is mounted on an extender card. A record enable relay, mounted on the component side of the circuit board, is energized when the tape transport is in the record mode. When the transport is not in the record mode, the relay is deenergized to prevent accidental erasing of data.

1-8. PERFORMANCE CHARACTERISTICS.

1-9. Typical performance characteristics for the record amplifiers are given in table 1-1.

ITEM	CHARACTERISTIC
Input Level	0.5 to 20 V peak-to-peak to produce normal record level via input potentiometer control. Maximum safe input power level is 0.5 watts. (See input impedance for voltage levels.)
Input Impedance	75 ohms shunted by 50 picofarads. Removal of the 75 ohm terminating resistor provides an input impedance of 20K ohms shunted by 50 picofarads.
Bias Frequency (12-442)	2.0 MHz.
Bias Frequency (12-442-2)	4.0 MHz.
Bandwidth (12-442)	100 Hz to 300 kHz.
Bandwidth (12-442-2)	400 Hz to 1 MHz.
Power	$\pm$15 Vdc, 50 mA.

Table 1-1. Typical Performance Characteristics



TP105-1

Figure 1-1. Direct Record Amplifier

SECTION II

INSTALLATION

2-1. GENERAL.

2-2. When the 4020 system is installed on an initial installation, the direct record amplifiers are installed when the installation procedures as described in Section II of the system manual have been completed.

2-3. When replacing a direct record amplifier, follow the installation procedures in Section II of the system manual; it will also be necessary to perform the calibration procedures described in the Calibration and Maintenance Section (Section V) of the system manual for the direct record/reproduce electronics.

SECTION III

OPERATION

3-1. GENERAL.

3-2. The 12-442-2 Direct Record Amplifier is fully operational when power is turned on. Refer to Section III of the system manual for the operational procedures of the direct record amplifier, as the direct record amplifier must be used in conjunction with a direct reproduce amplifier.

SECTION IV

THEORY OF OPERATION

4-1. GENERAL.

4-2. The direct record amplifier consists of a data amplifier section, a bias amplifier section, and a record enable relay. Since the proper bias and data signal levels are a function of the magnetic tape and magnetic head characteristics, and not the electronic circuitry, the two signals are amplified separately before being linearly mixed and applied to the record head. A bias trap between the two sections prevents the bias frequency from feeding into the data amplifier section which would cause signal distortion. The record enable relay prevents accidental tape erasure or double recordings when the system is in a RUN, FAST FWD, or FAST REV mode. These circuits are shown in detail in the schematic diagram, figure 7-1, and in block diagram form, figure 4-1; both of which may be referred to while reading the circuit descriptions which follow.

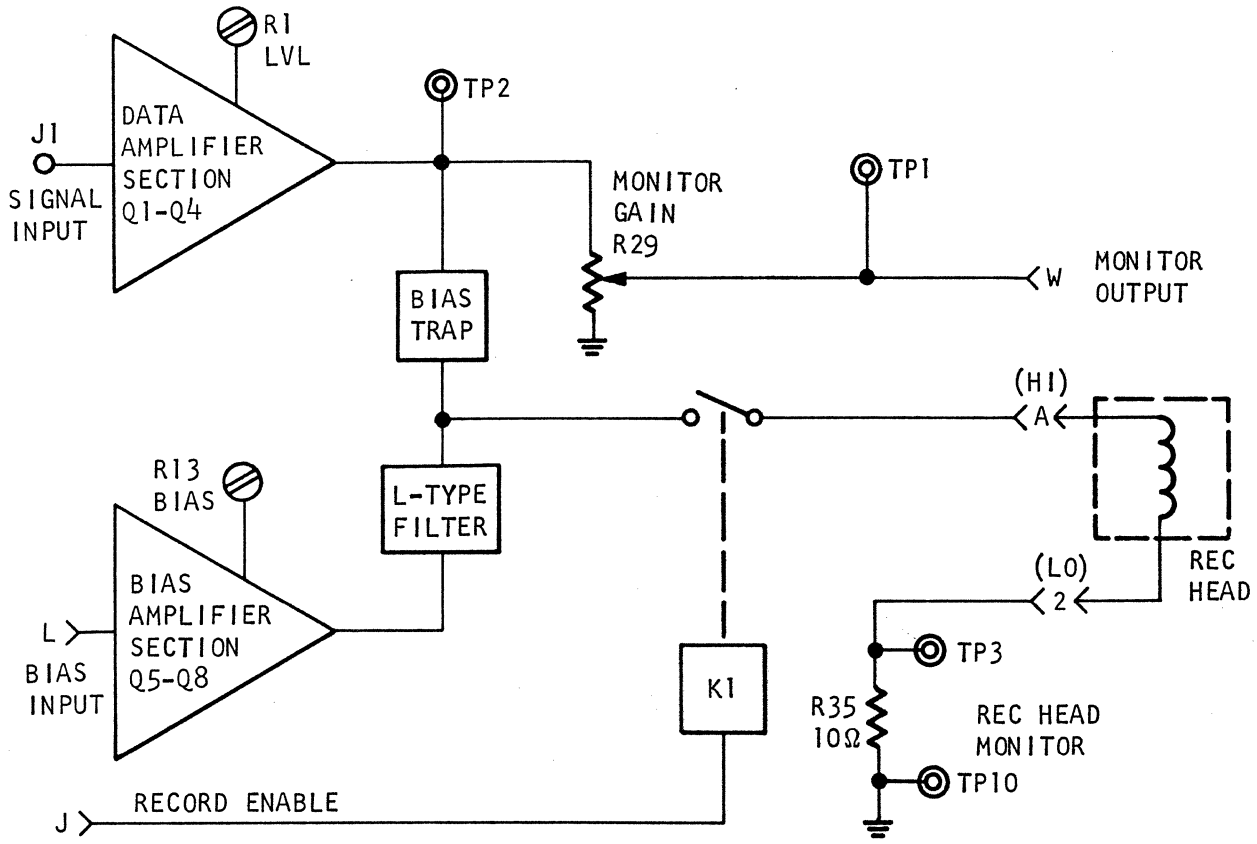


Figure 4-1. Block Diagram, Direct Record System

4-3. CIRCUIT DESCRIPTIONS.

4-4. DATA AMPLIFIER SECTION. The data amplifier section consists of four transistor amplifier circuits, Q1 through Q4, and a bias trap composed of L1, L4, C8, and C10.

4-5. TRANSISTOR STAGE Q1. The input signal is applied to the base of transistor Q1 through capacitors C1 and C2 and potentiometer R1. Potentiometer R1 is adjusted to attenuate the input signal to a normal record level described in Section V of the system manual. Resistor R34 is a 75 ohm terminating resistor which may be removed or replaced with a different value. The impedance of the amplifier is 20K ohms with R34 removed. Transistor Q1 is a class A amplifier. The output signal on the collector of Q1 is directly coupled to the base of transistor Q2. Degenerative feedback from Q3 and Q4 through the combination of R8, R4, and C3 improves stability, reduces distortion and widens the frequency response of the data amplifier section. Compensation for band edge losses is accomplished by C22 and R36 in the 12-442-2 amplifier. See Section V of the system manual for the adjustment procedures for the data amplifier section.

4-6. TRANSISTOR STAGES Q2, Q3, AND Q4. Transistor Q2 amplifies the data signal from Q1 and drives the complementary emitter-follower circuit of Q3 and Q4. The output of Q3 and Q4 is coupled through C21, C6, R12, and the bias trap network of L4-C10 to the normally open contacts of K1. The presence of a record enable command will energize K1, thus allowing the data and bias signals to drive the record head.

4-7. BIAS TRAP. The bias trap is a frequency selective voltage divider which prevents the bias frequency (2 MHz in the 12-442 amplifier, 4 MHz in the 12-442-2 amplifier) from feeding through to the signal amplifier, thus eliminating nonlinear intermodulations of the bias and data signals. This circuit consists of L1, C8, L4, and C10. At the bias frequency, L4 and C10 are a high impedance, and L1 and C8 are a low impedance which shunts the bias signal to ground. At all frequencies below the bias frequency, L4 and C10 are a low impedance, and L1 and C8 are a high impedance and the data is coupled out of K1 unattenuated.

4-8. BIAS AMPLIFIER SECTION. The bias amplifier section consists of four transistor amplifier circuits, Q5 through Q8, and an L-type series-parallel resonant circuit of C7, C9, C11, L2, L3, and R13. The purity of the bias frequency waveshape is dependent upon the circuit of L2, L3, C7, and C11. Resistor R13 is adjusted to provide the record head with the proper level of bias. See Section V of the system manual for the adjustment procedures for this bias amplifier section.

4-9. TRANSISTOR STAGE Q8. The bias is developed by the bias oscillator in the system and coupled to the base of Q8 through C17 via pin L. Q8 operates as a common collector amplifier. The bias signal on the emitter of Q8 is directly coupled to the base of Q7.

4-10. TRANSISTOR STAGES Q5, Q6, AND Q7. Transistor Q7 amplifies the bias signal from Q8 and drives the complementary emitter-follower circuit of Q5 and Q6. The output of Q5 and Q6 drives the L-type resonant circuit of C7, C9, C11, L2, L3, and R13. Capacitors C13, C14, C16, C18, C19, and C20 decouple the bias and data frequencies from the + and -15 volt power supplies.

4-11. RECORD ENABLE. The record enable relay K1 receives a ground signal on pin J when the transport is in the RECORD mode of operation or when the RCD TEST switch mounted on the optional monitor meter assembly is in the ON position. The normally open contacts of K1 are then closed and the circuit to the record head is complete. Figure 4-1 shows the record head circuit. Record current may be monitored at TP3 with an oscilloscope or an ac voltmeter. The value of the record current is determined by dividing the oscilloscope or ac voltmeter readings by 10. (Note: Standing waves may develop, causing erroneous reading.)

SECTION V

CALIBRATION AND MAINTENANCE

5-1. GENERAL.

5-2. This section of the direct record amplifier manual consists of preventive maintenance, and troubleshooting and corrective maintenance. The calibration procedures for the direct record amplifier are contained in Section V of the system manual since the direct record amplifier must be calibrated in conjunction with the direct reproduce amplifier.

5-3. PREVENTIVE MAINTENANCE.

5-4. Preventive maintenance consists of general cleaning and periodic inspection. Accumulation of dust, dirt, grit, and/or grease on the circuit boards is harmful and should be guarded against by periodic inspection and cleaning. Every three months inspect the amplifier card for signs of deterioration, loose connections, insecurity of mounting, and foreign matter. The period of cleaning depends on the particular operating environment and should be determined by inspection. As necessary, clean the circuit board with a soft brush, low air pressure, or suitable solvent, being careful not to damage the printed circuitry.

5-5. TROUBLESHOOTING AND CORRECTIVE MAINTENANCE.

5-6. Before attempting the repair of a unit suspected of a malfunction, verify that the symptom is not caused by the malfunction of associated equipment such as the reproduce amplifier, the power supply, the connector board assembly, or intercabling errors. This can be done by substituting a known good amplifier for the suspected one. If such a check eliminates the associated equipment as a source of trouble, check the adjustments which are detailed in Section V of the system manual.

5-7. Once the existence of a defective unit has been established, check it for obvious signs of damaged components, such as burned resistors, or incorrect seating of components. The next step is to check that the proper supply voltage is reaching the unit. If the supply voltage is correct, the faulty stage within the unit can be located by tracing the signals from stage to stage.

5-8. To trace signals, mount the amplifier on an extender card and apply a test signal to J1. Place the system in record test or run the transport at a slow speed in the record mode. Check TP2; the signal should be at least 140 mVrms. If it is not, check the setting of the Record Level potentiometer. Failure to observe the test signal at TP2 indicates a malfunction in the data amplifier section. Isolation of the defective component is a matter of tracing the signal back to the signal input stage of Q1. Should the test signal appear at TP2, check pin A of P1; relay K1 or a component of the bias trap may be defective. The normal waveform at pin A will be the bias frequency linearly mixed with the signal frequency. The bias frequency will be approximately ten times the amplitude of the signal frequency. Figure 5-1 is a drawing of a typical waveform showing the signal and bias frequency as it would appear at pin A or TP3.

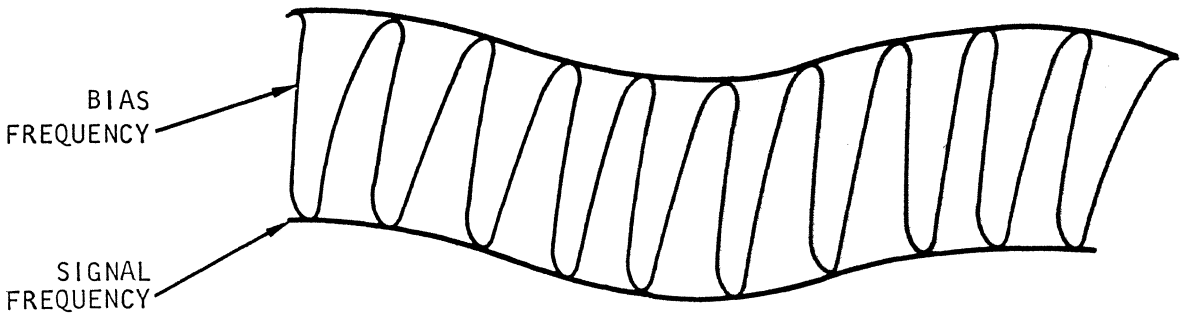


Figure 5-1. Typical Waveform for Linearly Mixed Signals

5-9. Should the waveform at pin A only be the test signal frequency, then a defect exists in the bias amplifier section. Isolation of a defective component in the bias amplifier section is accomplished by tracing the signal back to the bias input stage.

5-10. Should the waveform at pin A be normal, the record head current may be monitored between TP3 and TP10. If the signal on TP3 is normal, it would be well to suspect the tape, or the reproduce preamplifier. Refer to the maintenance section of the transport and reproduce amplifier manuals for the troubleshooting information on these assemblies.

5-11. Once the defective stage has been located, the defective component in that stage can be determined by reference to the schematic diagram, and by making continuity, voltage, and/or resistance measurements about the suspected components.

5-12. REPAIR.

5-13. Repair of the unit should be attempted only by an electronics technician or personnel experienced in printed wiring techniques. Recommended repair is limited to the replacement of defective components and adjustment of controls. When removing and replacing defective components, care should be exercised so as not to damage surrounding components or the circuit board. Replacement parts must be of the correct type and value, as listed in the parts list in Section VI. When installing a new part, place it in the exact position of the replaced part. After replacement, carefully inspect the circuit board for evidence of cold solder joints, solder splashes, and insecurity of mounting. If the equipment is repaired, the amplifiers should be checked and, if necessary, adjusted as described in Section V of the system manual.

5-14. PARTS IDENTIFICATION. Components of the direct record amplifier are illustrated in Section VI of this manual, showing locations and part designations. The parts list in Section VI itemizes the component parts in the assembly and provides a Bell & Howell part number for each.

5-15. FIELD REPAIR SERVICE.

5-16. Refer to Section V of the system manual for the procedures in obtaining field service repair.

5-17. FACTORY REPAIR SERVICE.

5-18. Refer to Section V of the system manual for factory repair service information.

SECTION VI

PARTS LIST

6-1. GENERAL.

6-2. Appropriate parts lists and illustrations for the 12-442 and 12-442-2 Direct Record Amplifiers, Bell & Howell part numbers 379511-0002 and 480052, respectively, covered by this manual follow the instructions given below. The parts lists (tables 6-1 and 6-2) include Bell & Howell DATATAPE Division part number, description, figure and index and/or schematic reference symbol, and where applicable, the manufacturer's or military part number for each component.

6-3. MANUFACTURER'S CODES.

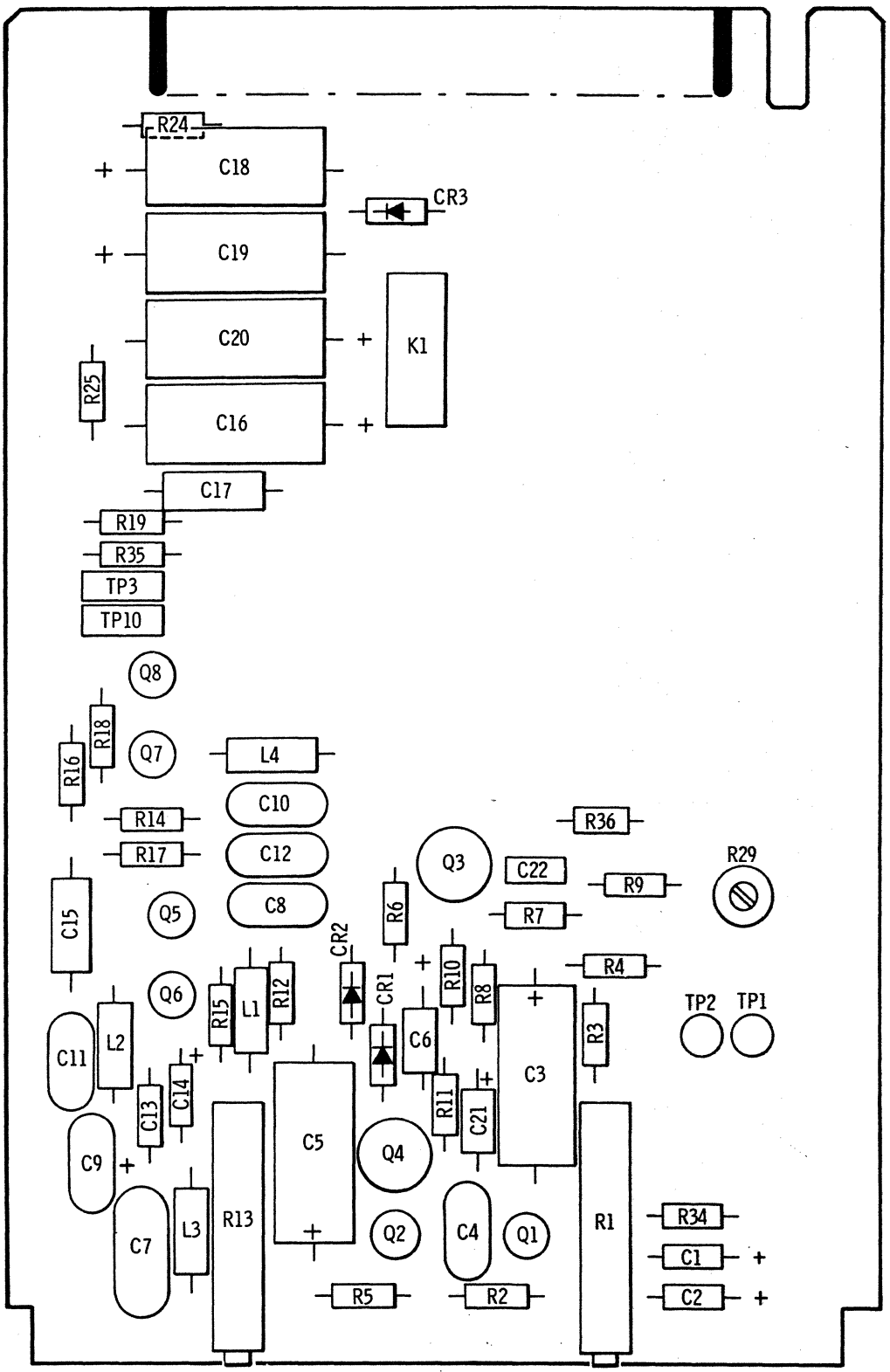
6-4. Manufacturer's code symbols used in the parts list are tabulated in the System manual with the manufacturer's name and address. All code symbols are in accordance with the Federal Supply Code for Manufacturers Handbooks H 4-1 and H 4-2.

6-5. ORDERING REPLACEMENT PARTS.

6-6. When ordering replacement parts refer to Section VI of the System manual for ordering instructions.

6-7. PARTS LOCATION ILLUSTRATIONS.

6-8. Figure 6-1 illustrates the location of components on the circuit card.



D-379467-F (REF)

Figure 6-1. Direct Record Amplifier Circuit Card

Table 6-1. Parts List for the 12-442 Direct Record Amplifier (Sheet 1 of 4)

ITEM NO.	B&H PART NO.	DESCRIPTION 0 1 2 3 4 5 6	QTY	FIG./INDEX OR REF SYM	MFR CODE	MFR OR MIL PART NO.
1	379511-0002	Direct Record Amplifier	1		14028	
2	379467-0003	Circuit Card Assembly	1	6-1	14028	
3	70094-0031	Cap, fixed, mica 150 pF ±5%, 500 Vdc	1	C12	93790	CD15F151J03-500WV
4	246954	Diode Signal Switching 25 V work volt 1N4154	2	CR1,2	03508	1N4154
5	372295-0002	Diode, rectifier 1.0A, 200 V, 1N4003	1	CR3	04713	1N4003
6	471863-0006	Cap, fixed, tantalum 2.2 uF ±20%, 25 Vdc	4	C1,2,13, C14	31433	T320A225-M25AS
7	70094-0012	Cap, fixed, mica 27 pF ±5%, 500 Vdc	1	C11	93790	CD15E270J03-500WV
8	215095-0592	Cap, fixed, mylar 0.01 uF ±10%, 80 V	2	C15,17	56289	192P1039R8
9	479699-0028	Cap, ceramic 1.8K pF ±10%, 100 Vdc	1	C22	72982	CK05BX182K
10	471930-0003	Cap, fixed, electrolytic 100 uF -10 +75%, 16 V	6	C3,5,16, C18,19, C20	14655	NLW 100-16
11	70094-0004	Cap, fixed, mica 5 pF ±0.5 pF, 500 Vdc	1	C4	93790	CD15C050J03-500WV
12	471863-0004	Cap, fixed, tantalum 10.0 uF ±20%, 20 Vdc	2	C6,21	31433	T320B106-M20AS
13	70094-0040	Cap, fixed, mica 330 pF ±5%, 500 Vdc	1	C7	93790	CD15F331J03-500WV
14	70094-0023	Cap, fixed, mica 68 pF ±5%, 500 Vdc	2	C8,10	93790	CD15E680J03-500WV
15	70094-0025	Cap, fixed, mica 82 pF ±5%, 500 Vdc	1	C9	93790	CD15E820J03-500WV

Table 6-1. Parts List for the 12-442 Direct Record Amplifier (Sheet 2 of 4)

ITEM NO.	B&H PART NO.	DESCRIPTION 0 1 2 3 4 5 6	QTY	FIG./INDEX OR REF SYM	MFR CODE	MFR OR MIL PART NO.
				6-1		
1	472460-0501	Relay, reed type 1 form A	1	K1	15636	RA30381051
2	472466-0005	Inductor, fixed, shielded 22 uH ±10%	2	L1,4	76493	9250-223
3	472466-0003	Inductor, fixed, shielded 15 uH ±10%	1	L2	72259	SWD-15
4	472466-0072	Inductor, fixed, shielded 4.7 uH ±10%	1	L3	76493	9250-472
5	471472	Transistor, NPN 2N3947	1	Q1	04713	2N3947
6	471931	Transistor, PNP 2N3251	2	Q2,8	04713	2N3251
7	471925	Transistor, PNP 2N2905	2	Q3,6	04713	2N2905
8	471927	Transistor, NPN 2N2219	2	Q4,5	04713	2N2219
9	471926	Transistor, NPN 2N2369	1	Q7	04713	2N2369
10	471573-1020	Res, var, carbon 20K ohm ±20%, 0.3 W	1	R1	01121	NP 203 M
11	471922-1002	Res, fixed, metal oxide 10 ohm ±2%, 1/4 W	5	R10,11, R14,15 R35	24546	C4-10 OHM 2 PCT
12	471573-0520	Res, var, carbon 1000 ohm ±20%, 0.3 W	1	R13	01121	NP 102 M
13	471922-1032	Res, fixed, metal oxide 10K ohm ±2%, 1/4 W	1	R19	24546	C4-10K OHM 2 PCT

Table 6-1. Parts List for the 12-442 Direct Record Amplifier (Sheet 3 of 4)

ITEM NO.	B&H PART NO.	DESCRIPTION 0 1 2 3 4 5 6	QTY	FIG./INDEX OR REF SYM	MFR CODE	MFR OR MIL PART NO.
				6-1		
1	471922-1822	Res, fixed, metal oxide 1.8K ohm ±2%, 1/4 W	1	R2	24546	C4-1800 OHM 2 PCT
2	471922-3302	Res, fixed, metal oxide 33 ohm ±2%, 1/4 W	2	R24,25	24546	C4-33 OHM 2 PCT
3	366427-0007	Res, var, cermet 1K ohm ±20%, 1/2 W	1	R29	32997	3339P-1-102
4	471922-5122	Res, fixed, metal oxide 5.1K ohm ±2%, 1/4 W	1	R3	24546	C4-5.1K OHM 2 PCT
5	471922-7502	Res, fixed, metal oxide 75 ohm ±2%, 1/4 W	1	R34	24546	C4-75 OHM 2 PCT
6	471922-5102	Res, fixed, metal oxide 51 ohm ±2%, 1/4 W	1	R36	24546	C4-51 OHM 2 PCT
7	471922-1012	Res, fixed, metal oxide 100 ohm ±2%, 1/4 W	1	R4	24546	C4-100 OHM 2 PCT
8	471922-1022	Res, fixed, metal oxide 1K ohm ±2%, 1/4 W	4	R5,12, R16,17	24546	C4-1K OHM 2 PCT
9	471922-2002	Res, fixed, metal oxide 20 ohm ±2%, 1/4 W	1	R6	24546	C4-20 OHM 2 PCT
10	471922-2722	Res, fixed, metal oxide 2.7K ohm ±2%, 1/4 W	1	R7	24546	C4-2700 OHM 2 PCT
11	471922-2022	Res, fixed, metal oxide 2K ohm ±2%, 1/4 W	1	R8	24546	C4-2K OHM 2 PCT
12	471922-6222	Res, fixed, metal oxide 6.2K ohm ±2%, 1/4 W	1	R9	24546	C4-6200 OHM 2 PCT
13	376087-0001	Connector, (vertical jack) brown	1	TP1	74970	105-858
14	204749-1003	Jack, tip, horizontal, pc black	1	TP10	83330	430-103

Table 6-1. Parts List for the 12-442 Direct Record Amplifier (Sheet 4 of 4)

ITEM NO.	B&H PART NO.	DESCRIPTION 0 1 2 3 4 5 6	QTY	FIG./INDEX OR REF SYM	MFR CODE	MFR OR MIL PART NO.
				6-1		
1	376087-0002	Connector, (vertical jack) red	1	TP2	74970	105-852
2	204749-1006	Jack, tip, horizontal pc orange	1	TP3	83330	430-106
3	155527-0001	Ferrule RF Cable Grounding, violet	2		00779	323930
4	126716-0174	Cable, rf, coaxial RG/174A/U	1		23172	QPL-17
5	379656-0002	Panel Assembly, front	1		14028	
6	126732-0031	Connector, coaxial panel, receptacle	1	J1	91836	KC-79-46
7	379494-0002	Panel, front, amplifier module	1			
8	7127-0002	Terminal, lug, solder screw size 3/8	1		71002	4
9	479639	Plate, connector mount	1			
10	379495	Plate, electrical shield	1			

Table 6-2. Parts List for the 12-442-2 Direct Record Amplifier (Sheet 1 of 4)

ITEM NO.	B&H PART NO.	DESCRIPTION 0 1 2 3 4 5 6	QTY	FIG./INDEX OR REF SYM	MFR CODE	MFR OR MIL PART NO.
1	480052	Amplifier, direct record, wide band	1		14028	480052
2	379467-0002	Circuit Card Assembly	1	6-1	14028	
3	246954	Diode, signal switching 25 V work volt, 1N4154	2	CR1,2	03508	1N4154
4	372295-0002	Diode, rectifier 1.0A, 200 V, 1N4003	1	CR3	04713	1N4003
5	471863-0006	Cap, fixed, tantalum 2.2 uF ±20%, 25 Vdc	4	C1,2,13, C14	31433	T320A225-M25AS
6	70094-0012	Cap, fixed, mica 27 pF ±5%, 500 Vdc	1	C11	93790	CD15E270J03-500WV
7	70094-0031	Cap, fixed, mica 150 pF ±5%, 500 Vdc	1	C12	93790	CD15F151J03-500WV
8	215095-0592	Cap, fixed, mylar 0.01 uF ±10%, 80 V	2	C15,17	56289	192P1039R8
9	479699-0028	Cap, ceramic 1.8K pF ±10%, 100 Vdc	1	C22	72982	CK05BX182K
10	471930-0003	Cap, fixed, electrolytic 100 uF -10 +75%, 16 V	6	C3,5,16, C18,19, C20	14655	NLW 100-16
11	70094-0004	Cap, fixed, mica 5 pF ±0.5 pF, 500 Vdc	1	C4	93790	CD15C050J03-500WV
12	471863-0004	Cap, fixed, tantalum 10.0 uF ±20%, 20 Vdc	2	C6,21	31433	T320B106-M20AS
13	70094-0040	Cap, fixed, mica 330 pF ±5%, 500 Vdc	1	C7	93790	CD15F331J03-500WV
14	70094-0023	Cap, fixed, mica 68 pF ±5%, 500 Vdc	3	C8,9,10	93790	CD15E680J03-500WV

Table 6-2. Parts List for the 12-442-2 Direct Record Amplifier (Sheet 2 of 4)

ITEM NO.	B&H PART NO.	DESCRIPTION 0 1 2 3 4 5 6	QTY	FIG./INDEX OR REF SYM	MFR CODE	MFR OR MIL PART NO.
				6-1		
1	472460-0501	Relay, reed type 1 form A	1	K1	15636	RA30381051
2	472466-0005	Inductor, fixed, shielded 22 uH ±10%	2	L1,4	76493	9250-223
3	472466-0003	Inductor, fixed, shielded 15 uH ±10%	1	L2	72259	SWD-15
4	472466-0072	Inductor, fixed, shielded 4.7 uH ±10%	1	L3	76493	9250-472
5	471472	Transistor, NPN 2N3947	1	Q1	04713	2N3947
6	471931	Transistor, PNP 2N3251	2	Q2,8	04713	2N3251
7	471925	Transistor, PNP 2N2905	2	Q3,6	04713	2N2905
8	471927	Transistor, NPN 2N2219	3	Q4,5,7	04713	2N2219
9	471573-1020	Res, var, carbon 20K ohm ±20%, 0.3 W	1	R1	01121	NP 203 M
10	471922-1002	Res, fixed, metal oxide 10 ohm ±2%, 1/4 W	5	R10,11, R14,15 R35	24546	C4-10 OHM 2 PCT
11	471573-0520	Res, var, carbon 1000 ohm ±20%, 0.3 W	1	R13	01121	NP 102 M
12	471922-1032	Res, fixed, metal oxide 10K ohm ±2%, 1/4 W	2	R18,19	24546	C4-10K OHM 2 PCT
13	471922-1822	Res, fixed, metal oxide 1.8K ohm ±2%, 1/4 W	1	R2	24546	C4-1800 OHM 2 PCT

Table 6-2. Parts List for the 12-442-2 Direct Record Amplifier (Sheet 3 of 4)

ITEM NO.	B&H PART NO.	DESCRIPTION 0 1 2 3 4 5 6	QTY	FIG./INDEX OR REF SYM	MFR CODE	MFR OR MIL PART NO.
				6-1		
1	471922-3302	Res, fixed, metal oxide 33 ohm ±2%, 1/4 W	2	R24,25	24546	C4-33 OHM 2 PCT
2	366427-0007	Res, var, cermet 1K ohm ±20%, 1/2 W	1	R29	32997	3339P-1-102
3	471922-5122	Res, fixed, metal oxide 5.1K ohm ±2%, 1/4 W	1	R3	24546	C4-5.1K OHM 2 PCT
4	471922-7502	Res, fixed, metal oxide 75 ohm ±2%, 1/4 W	1	R34	24546	C4-75 OHM 2 PCT
5	471922-5102	Res, fixed, metal oxide 51 ohm ±2%, 1/4 W	1	R36	24546	C4-51 OHM 2 PCT
6	471922-1012	Res, fixed, metal oxide 100 ohm ±2%, 1/4 W	1	R4	24546	C4-100 OHM 2 PCT
7	471922-1022	Res, fixed, metal oxide 1K ohm ±2%, 1/4 W	4	R5,12, R16,17	24546	C4-1K OHM 2 PCT
8	471922-2002	Res, fixed, metal oxide 20 ohm ±2%, 1/4 W	1	R6	24546	C4-20 OHM 2 PCT
9	471922-2722	Res, fixed, metal oxide 2.7K ohm ±2%, 1/4 W	1	R7	24546	C4-2700 OHM 2 PCT
10	471922-2022	Res, fixed, metal oxide 2K ohm ±2%, 1/4 W	1	R8	24546	C4-2K OHM 2 PCT
11	471922-6222	Res, fixed, metal oxide 6.2K ohm ±2%, 1/4 W	1	R9	24546	C4-6200 OHM 2 PCT
12	376087-0001	Connector, (vertical jack) brown	1	TP1	74970	105-858
13	204749-1003	Jack, tip, horizontal, pc black	1	TP10	83330	430-103
14	376087-0002	Connector, (vertical jack) red	1	TP2	74970	105-852

Table 6-2. Parts List for the 12-442-2 Direct Record Amplifier (Sheet 4 of 4)

ITEM NO.	B&H PART NO.	DESCRIPTION 0 1 2 3 4 5 6	QTY	FIG./INDEX OR REF SYM	MFR CODE	MFR OR MIL PART NO.
				6-1		
1	204749-1006	Jack, tip, horizontal pc orange	1	TP3	83330	430-106
2	379656-0002	Panel Assembly, front	1		14028	
3	126732-0031	Connector, coaxial panel, receptacle	1	J1	91836	KC-79-46
4	379494-0002	Panel, front, amplifier module	1			
5	7127-0002	Terminal, lug, solder screw size 3/8	1		71002	4
6	479639	Plate, connector mount	1			
7	379495	Plate, electrical shield	1			

SECTION VII

SCHEMATICS

7-1. GENERAL.

7-2. This section contains the schematic diagram (figure 7-1) for the 12-442 and 12-442-2 Direct Record Amplifiers.

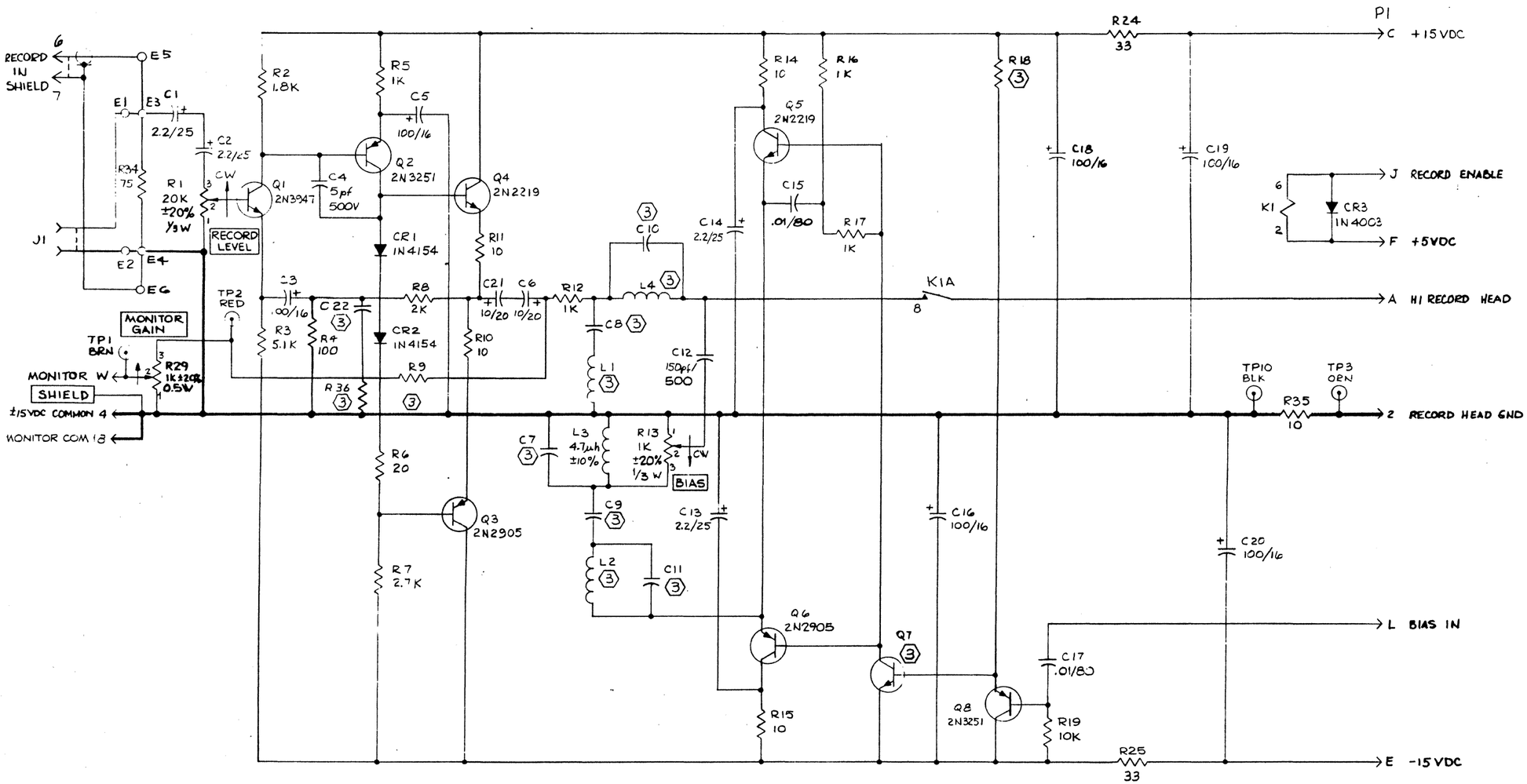
⟨3⟩ SEE TABULATION FOR VALUES.

2. ALL CAPACITORS ARE IN uF/VDC.

1. ALL RESISTORS ARE IN OHMS ±2%, 1/4 W.

NOTES: UNLESS OTHERWISE SPECIFIED.

COMPONENT DESIGNATION	379503 (2 MHz)	379503-0001 (4 MHz-WB)	379503-0002
R18	33K	10K	10K
R36	OMIT	51 OHM	51 OHM
C7	1300 pF, 500 V	330 pF, 500 V	330 pF, 500 V
C8,C10	150 pF, 500 V	68 pF, 500 V	68 pF, 500 V
C9	150 pF, 500 V	68 pF, 500 V	82 pF, 500 V
C11	47 pF, 500 V	27 pF, 500 V	27 pF, 500 V
C22	OMIT	1800 pF, 50 V	1800 pF, 50 V
L1,L4	47 uH ±10%	22 uH ±10%	22 uH ±10%
L2	33 uH ±10%	15 uH ±10%	15 uH ±10%
Q7	2N2219	2N2219	2N2369
R9	6.2K	6.2K	3.3K
ASSY USED ON	D-379467-0001	D-379467-0002 12-442-2	D-379467-0003 12-442



D-379503-G(REF)

Figure 7-1. Schematic, Direct Record Amplifier